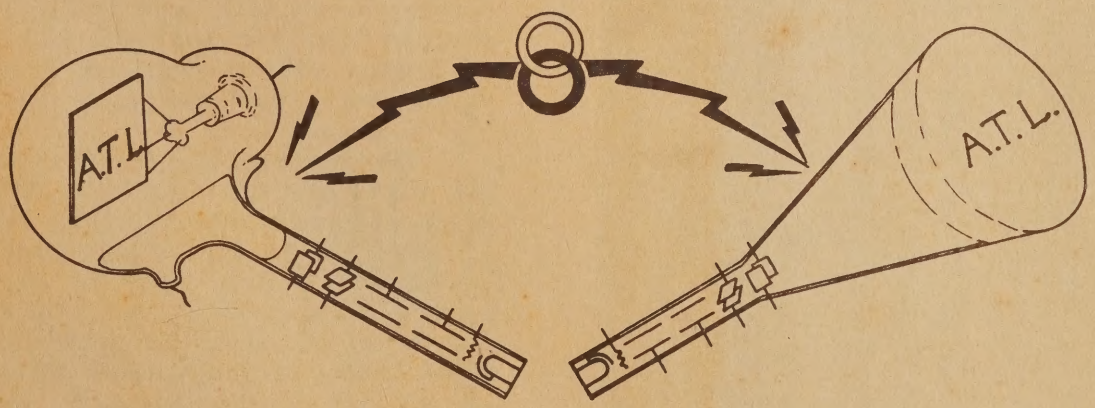
TELEVISION RADIO ELECTRONICS



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ASSIGNMENT No. 1

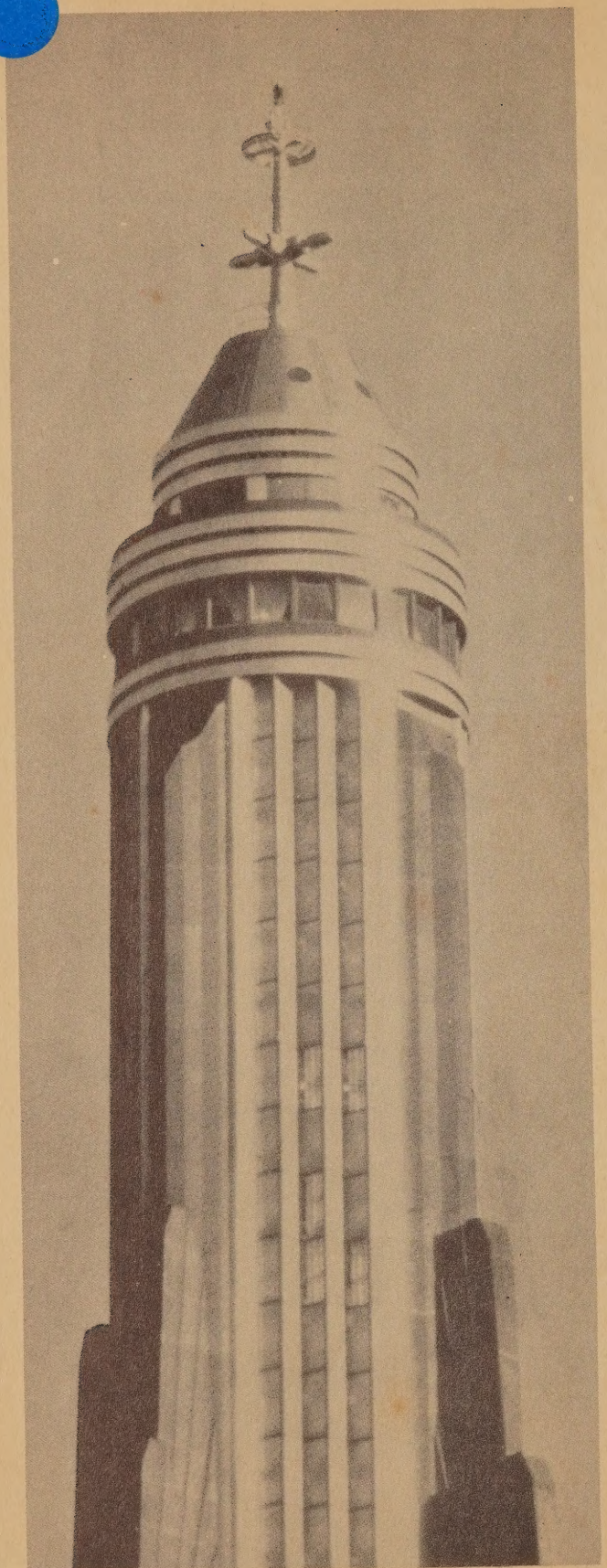


Fig. 1. Television and voice ultra short wave emitters atop the Empire State Building.

FOREWORD

America was settled by a people who were dissatisfied with their present situation and future prospects several generations ago. They left Europe and came here to find greater opportunity to get one thing they desired most which was liberty with security. Each succeeding generation has had problems to face in order to preserve American freedom. Today, the greatest threat to our American system is the young man who is unable to find prosperity in this rich nation.

Whether we like to admit it or not, we have, in effect, in our government many things which would have made Americans prior to our time call us socialistic or communistic. In a large measure, we have banded together in order to achieve greater security by working collectively rather than individually. But our foreign neighbors have taught us how easily we might confuse idealistic purposes with dictatorship. When young men get dissatisfied, they are inclined to follow any leadership which promises better conditions, whether these promises are based upon fact or fiction. It follows that our national security is in danger unless young America finds worthy employment and adequate income.

Fortunately, during these unrestful hours at this important crossroad, another new industry is born which has the capacity to employ more people than nearly any other industry since the railroads were built. Not only men, but women, may find their future in this magnificient achievement of science. If you are one of the Americans who will share responsibility for your country, to those who come to depend upon you, and to yourself, our organization stands ready to assist in every possible way to give you the opportunity to obtain satisfactory television employment in an American way.

AMERICAN TELEVISION LABORATORIES, INC.

Chicago --- Hollywood

When a business needs help, the Directors usually contact an employment agency or advertise in a newspaper. Generally, there are many people for every job available in ordinary business--but if we should advertise under the "help wanted" columns, for television operators and engineers, we could not begin to get sufficient ability to do the work required for regular service. The television industry must have many operators and engineers for national service quickly. Since our organization and our engineers are substantially identified as prime movers in Radio and Television, we have taken upon ourselves the task of providing technical man-power for the industry on a National scale.

We are interested in nearly anyone who has the ability to learn and do the technical work required. We expect the men entering into this training to do television operating and engineering work in television broadcasting stations, factories and laboratories. It requires steady application, regular habits, and a sense of responsibility. A control operator on a National network, or the television cameraman, during an important broadcast, must be the type of man who realizes that ten million people depend upon his reliability in running his section of the network.

It follows that salaries for this type of work are in the higher brackets. We find operators and engineers earning salaries well above the average and ranging upward into some of the most substantial incomes in business. A good technician possessing average ability with the proper training, can expect to earn considerably more than in ordinary work, because men in similar fields as radio operating and sound motion pictures, enjoy some of the steadiest employment in American business. A man can be a good operator or engineer into his old age, because the work is not strenuous and his ability improves rather than diminishes with age and experience.

You are one of the men with whom we have entered into an arrangement to qualify for employment in the television industry. We can best make our mutual agreement clear by turning back the clock a number of years and picturing the automobile industry at the beginning of the Century. Let us assume that in 1900 we did not have the crude automobile which looked like a carriage without a horse--but rather a modern automobile, perfect in every detail, ready for the public. *Imagine, that the automobile had to be as perfect as it is now before the public would use it*;--all of the development to make it so perfect had gone on in secrecy in private laboratories. Then, let us follow our story and further imagine that 200 automobiles are released in the City of Detroit. There are only two garages and two service stations. The automobiles

Fig. 2. RCA artist's conception of the entertainment telecast from the Empire State Television antenna.

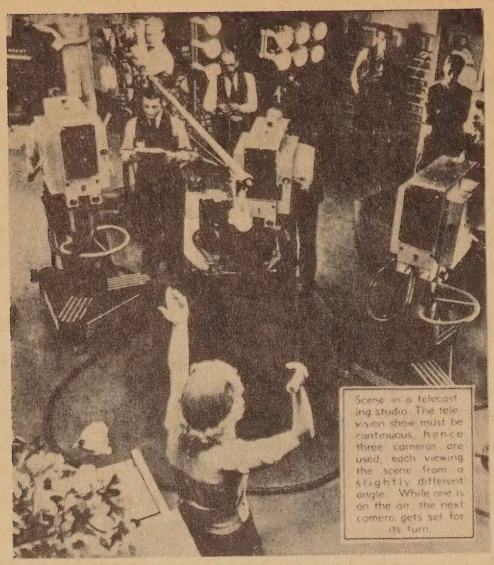
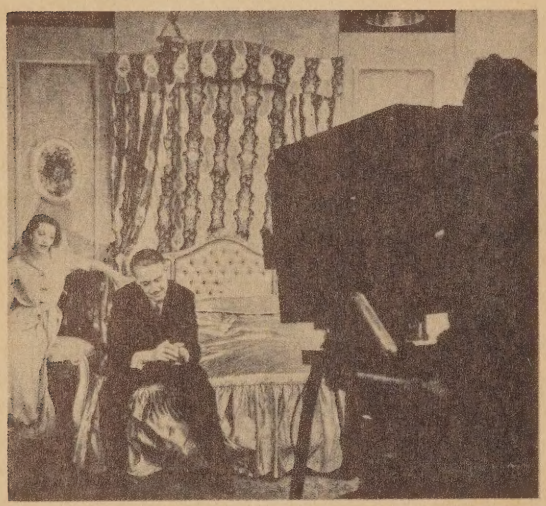


Fig. 3.



A television camera shooting a play — Gertrude Lawrence and Paul McGrath in "Susan and God"

Fig. 4.

Fig. 5. British Television Camera and operator picking up Military Parade.

can not venture very far beyond the city limits. The entire nation would want and demand automobiles after learning that they were perfect--but it would not be possible to give the automobiles to the public without men to build them, service them, and maintain them. We would have to have tire manufacturers, highway builders, traffic control experts, filling station operators, and the great gasoline companies, almost all at once. Think of what an enormous a task it would be to launch the entire automobile industry, with all its associated businesses at one time, and then think of the task of training the necessary men to do all this work. *A manufacturer would send out agents to cruise the country to find hundreds of able young men to train for the jobs.*

Television is now as perfect as the sound motion picture. It is giving a full scale perfected service in the New York City area. Since the principle function of Television is to bring the regular sound motion picture into your home on a large screen on top of your receiver,--it had to be as perfect as the sound motion picture before it had any value whatsoever. People would not accept anything that is less perfect than they can get in the theater. Television engineers had to make television perfect and then placed it on the market in New York and said, "Here it is". The great value of television made it necessary to keep all of the work secret until all of the inventions were covered by patents. Now, the public wants television in a hurry. The industry is ready for National Expansion--A gigantic industry that will employ a million people--yet at the present time there are hardly more than enough technicians to operate four stations properly. The RCA-NBC work in New York on one station involves nearly one hundred technicians. The nature of television requires that a thousand stations be built across the country in the form of a tremendous electrical network like our telephone and electric power service. *As a corporation in the television industry, we are sending agents all over the nation looking for men with ability to help the industry grow.*

There are a number of things we require from any man entering into our working agreement who plans to enter employment in this field.

1. He must, at the present time, be engaged in work that he does not expect to follow for life.

2. He must be able to furnish good references for character, morals, and responsibility.

3. He must agree that upon conclusion of his training, he will accept a position in television, if offered through our organization, on a salary which is at least as substantial as he can obtain elsewhere.

4. He must be able to show, during the first few lessons, through the mail, that he has a good understanding of the material contained in the texts we send to him.

5. He must do the work assigned to him within a reasonable length of time.

We have had the question put to us, "*Why isn't it logical for a man to wait and see about getting into television when the industry is grown. There ought to be more jobs and more opportunity then.*" In answer to this, we can say, "The telephone industry has grown up. There were men who made fortunes in telephony and who hold big jobs with the telephone companies, but they grew up with the business. Try and find one of those opportunities now". "Twenty years ago, there was a great opportunity in the radio business; and fifteen years ago, there was great opportunity in sound motion picture business. *Try and find one of those opportunities now*".

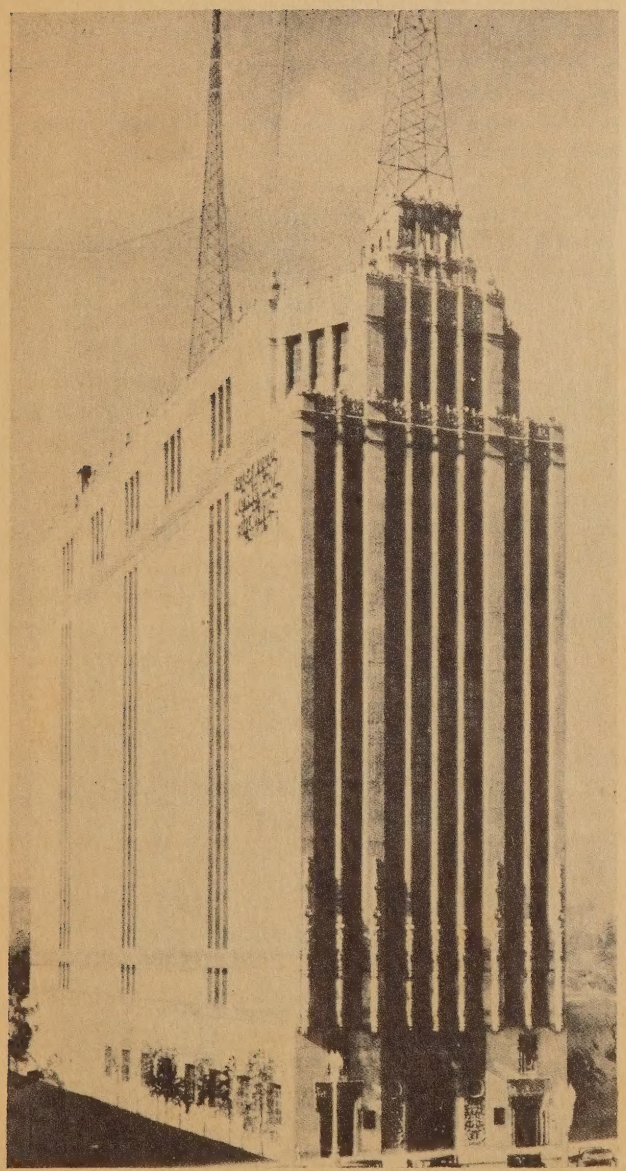


Fig. 6. Hollywood location of American Television Laboratories. Dr. Lee De Forest directs the activities here in person.

In further consideration, let us think about modern railways. If the railroads were not already in existence, it is doubtful that such a method of transportation would be entertained today. If it should, we can be sure that we would not stand for the same locomotives and coaches our grandfathers endured. We would expect to see a sample hundred mile track, and a modern streamlined train, whizzing back and forth to prove to us that it is thoroughly safe and practical; then we would set out to build the railroad on a national scale "all at once". Could we build national railroads "all at once", even if we wanted to? Obviously there would only be a few engineers who had perfected the railroad who would know anything about it; they would probably have one small steel company acquainted with the problems of making rails -- one lumber company acquainted with how to preserve ties -- a few workmen would be acquainted with anchoring the ties and rails and bending the track properly. The engineers would know all about car wheels and bearings, and all about the power house or locomotive; but, these few men could not build a national railroad -- nor could they operate it. The few engineers could only teach others how to do it in the shortest possible space of time. Then the nation would, in effect, have to "declare war". The enemy would be the obstacles preventing national railroads; it would require organized effort -- overtime work -- thousands upon thousands of people would be employed in all the industries that go to make up the suppliers of the modern railroads. There would have to be all of the technical personnel involved in railroading. No matter how fast and how hard all of these people would work, it would take many years to construct all of the roads and give national service.

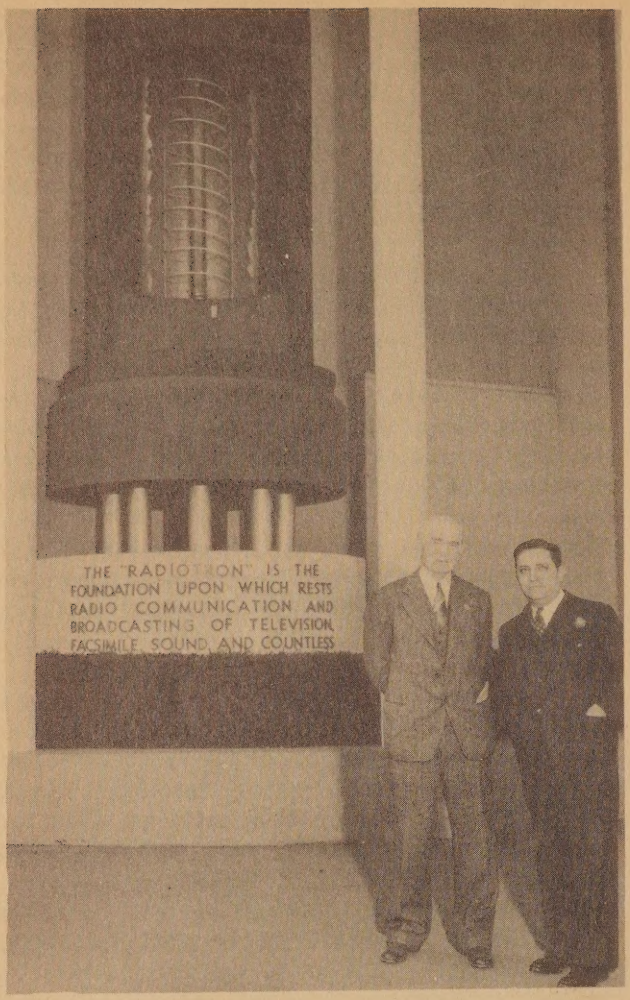


Fig. 6a. Dr. Lee De Forest of the American Television Laboratories, standing before his invention the Radiotron, at the New York World's Fair with the Promotion Manager for RCA.

Fig. 6b. U.A. Sanabria, Chicago director of the American Television Laboratories--inventor of the standard scanning system used by all television organizations, shown here discussing his recent invention, the television torpedo.

But, from what we know of railroading, a young man would not wait to get in until after the railroads were all built -- naturally all of the good jobs would be taken up by the men who helped build it. All of the big salaried jobs would be taken -- substantial unions would have been formed and the man thinking of going into railroading then would face a poor opportunity.

Today, television is perfected as good as the sound motion picture. There are several stations throughout the country giving good service and the pioneering experimental work is over. Naturally there will be further improvement. But it will not be so evident. Each step will only be a small improvement hereafter, not self-evident to the public. The television industry is now ready to go into national service. We are now ready to declare war on depression and build another billion dollar industry -- *and we must have men* -- men who know how to operate television transmitters, men who know how to build them -- and men who know that success in the industry means growing up with it and not waiting to try and get in after the industry is built. Television will have its big salaried men, its good jobs, and its unions; and the newcomer, before long, will find the door of opportunity in television closed to him, as it is in all of the older lines of work now.

We are now at that point where we are ready to proceed with our instruction to determine whether or not you are adapted to this type of work. During the progress of your instruction, we will see where television stands. How perfect it is -- and the many jobs that are to be filled. -- Follow carefully each paragraph so that you can answer the questions with this assignment properly.

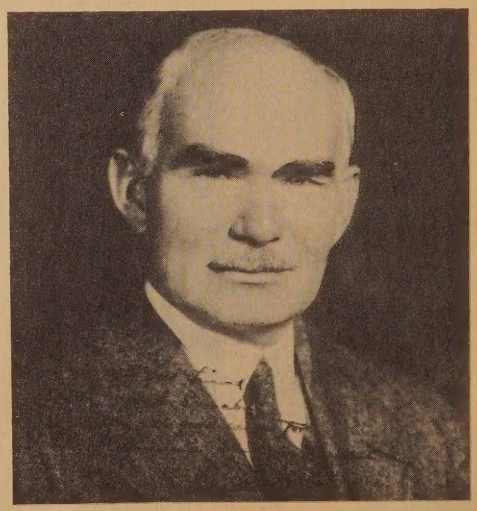


Fig. 6c. Dr. Lee De Forest, internationally known radio scientist;--Father of radio broadcasting---inventor of the radio tube--research director of American Television Laboratories, Hollywood, Cal.

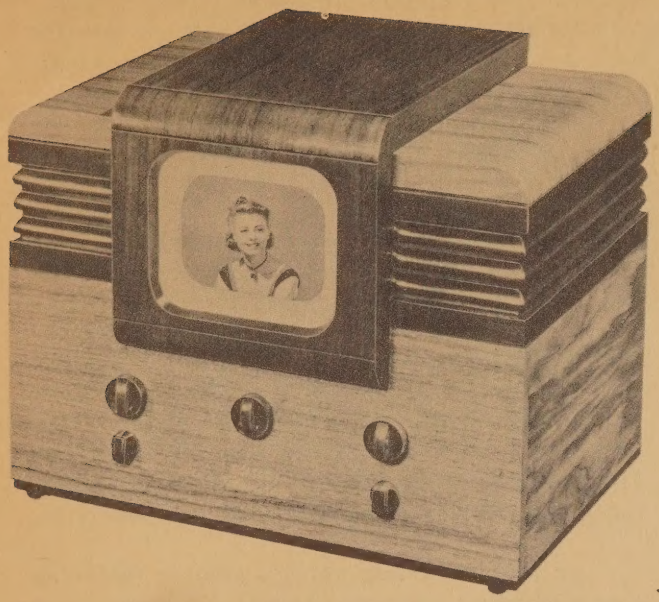


Fig. 7. Picture quality on inexpensive RCA-Victor television receiver.

Fig. 8. Electronic Laboratory scene, American Television Laboratory, Chicago.

Fig. 9. Extreme tube sizes in modern television receivers.

You have read over a good many words. It is now time for us to get into the technical phases of television. It is evident that the words you read have to be written by a person. It is not possible for several men to write one article.

Since we are primarily investigating an engineering subject, let us be informal and treat it in an engineering way. We work with our brains and our hands. We strive directly for a result. In fact, we define an engineer as, *one who with limited time and limited facilities, can do what any fool can do with unlimited time and unlimited facilities.* Briefly that is all there is to any kind of engineering. Any intelligent person can figure out how a simple machine works if he is given enough time and enough money to do it. An engineer must arrive at a desired result with a minimum of expense in the shortest possible length of time.

I can best give you a knowledge of television engineering by assuming that you are here in the laboratory with me. I want to show you how to use your brains as well as your hands in working with television equipment. Let us start out together.--Let us imagine you are asking me questions--or better still--let us assume that you are actually working in a good job in a television station, and let me show you how to keep this job. You have completed all of our training--you have helped the television industry along by qualifying yourself as a television cameraman.--A large station has been constructed, and through our mutual efforts, let us assume that you have acquired a job and joined a television union, and are earning a salary of $105.00 a week. Obviously, you want to keep this job--you have to be able to "shoot trouble" within your machine when it occurs.--Good jobs like this are not held on the strength of a good smile, or a clean-shaven face, or a nice personality, or even sincere intentions.--You only hold that kind of a job by knowing your business.

If someone asked you"What is the lens for on an iconoscope camera?"--you might have a good general idea--you might say, "It is to focus the picture that is being sent out over the air". But if they asked you about the *power* of the lens, and the resolution of the lens, and whether or not it was *rectilinear*, or *wide angle*, or *astigmatic*, or *corrected for chromatic aberration*, would you know how to answer it? Would you know how to make such a lens? Would you know what to order in buying such a lens? Would you know where to get it quickly by telephoning for it, if it were broken? If they asked you why the lens had a hood on it--would you know how to answer? If the hood were missing--would you know how to correct

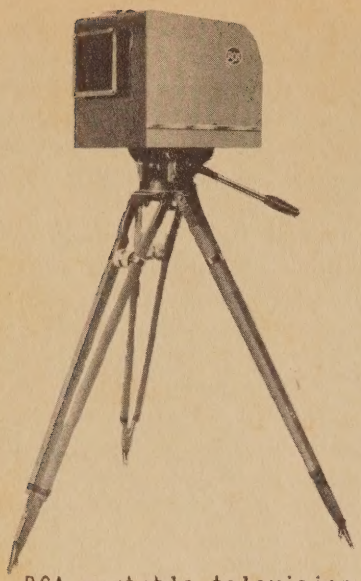


Fig. 10. RCA portable television camera.

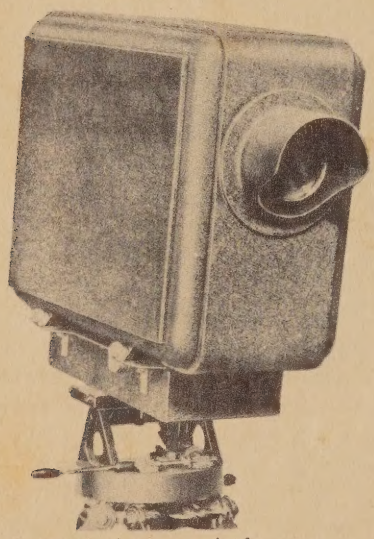


Fig. 11. DuMont indoor telecamera.

Fig. 12. General Electric Telecamera.

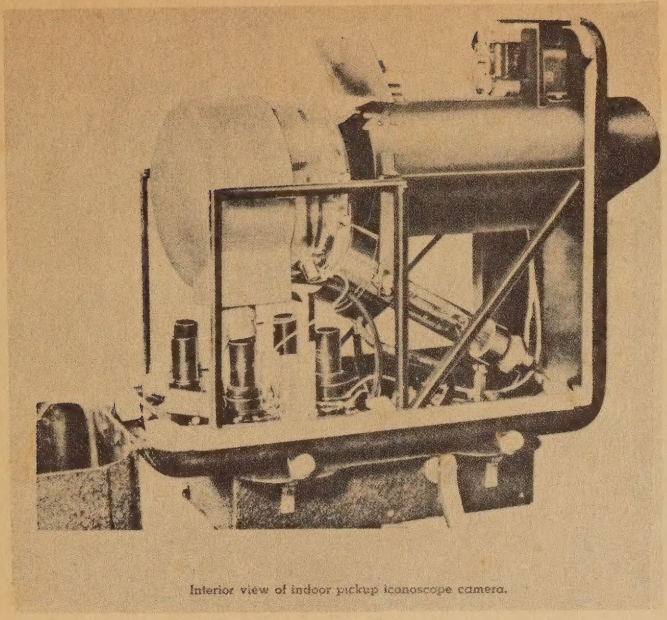
the resulting distortion in the electrical circuit. If there were a crack in the lens--would you know the best position to get a minimum of distortion?

These are some of the things you must know how to answer, if you are going to work with television cameras.

There are many other parts to a television camera than the lens. There is a lens on every ordinary camera, but in the Television camera, there is an iconoscope, or an image dissector, or a dark spot scanner, and there are amplifiers, electron multipliers, range finders, and compensating circuits. There are anti-vibration suspensions, and electrical and mechanical filters. On some cameras there are Selsyn motors. Then, there is the electronic transformer and the coaxial cable into the main amplifier.

If you were transmitting a program featuring some outstanding performers in motion pictures, such as, Clark Gable and Myrna Loy, and your camera suddenly stopped working, you would see a red light on your camera indicating that it was out of order, and another telecamera operator would be carrying on--but the station director would expect you to be back in service in a few minutes. There are many possibilities of trouble, even more than when an automobile motor stops working. You must isolate this trouble quickly. Fortunately you do not have to "get out and get under" to find this kind of trouble. You don't have to get covered with grease, or burn your hands--you can still find the trouble, without physical discomfort, but you must use your head. You must use your previous knowledge and experience--you must be so well acquainted with that camera that you can *smell the trouble*, or *feel it*, instead of having to *analyze it*. You won't be able to do this at first, but that camera must become so familiar to you, that your wife will wake you up at night and ask you to stop talking about cameras in your sleep.

You might have quite a variety of television cameras to work with. Perhaps you have the RCA telecamera, shown in fig. 10, or you may have the Dumont telecamera, shown in Fig. 11, or the General Electric telecamera, shown in Fig. 12. Fundamentally all the various makes of telecameras are alike under the cover. The chassis of the Dumont telecamera presents an impressive appearance. It looks simple and durable like any well engineered device. Yes, the lower part looks like a radio chassis, but the upper section is different than any electrical or optical device we have ever seen. There is the mirror for the operator to see how sharp the focus on the plate of the Iconoscope may be. There is a motor in the upper right corner to permit remote control focusing by the studio operator. Some of the equipment is familiar, but the entire television camera has a strange-fascinating appearance, very much



Interior view of indoor pickup iconoscope camera.

Fig. 13.

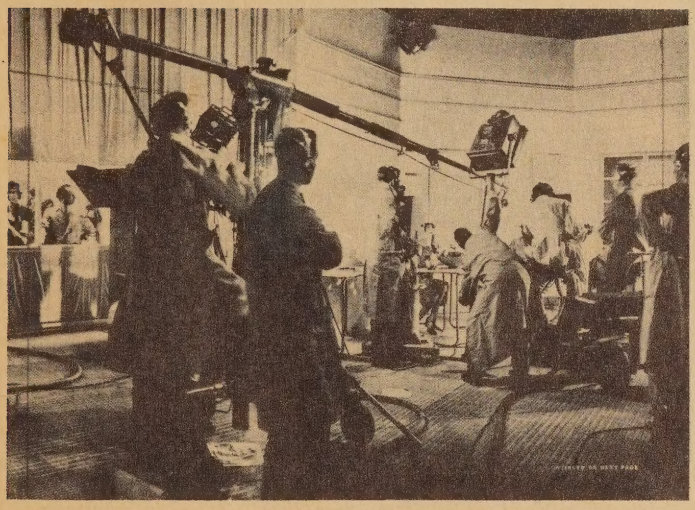


Fig. 14. Television sending studio in action.

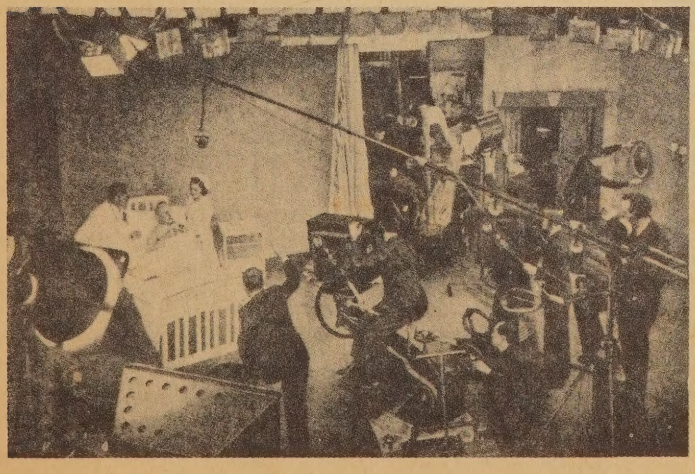


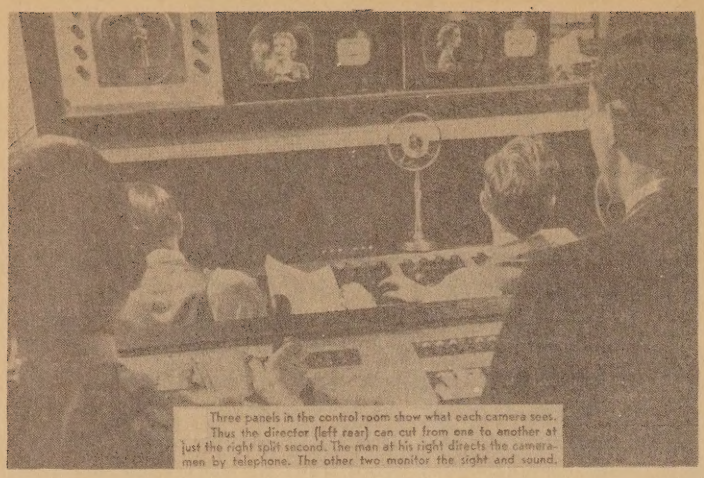
Fig. 15. Hospital scene in television studio.

like something from another world--something that belongs to Buck Rogers or Flash Gordon, or to amazing stories and science-fiction. To a large extent, television is science-fiction made real. To most of us, it is just a dream. It has come out of the laboratory, fully perfected. It might just as well have been given to us by a man from another planet. It did not "grow up" slowly, it *happened*, fully perfect "all at once".

Perhaps we are moving a little too fast. You are already into one of the technical devices, ready to operate it or fix it, if it gives trouble. Possibly you would rather have some other job in the television industry; after all, "every man to his own liking", is an old adage. There are so many different kinds of occupations in the television industry.--I might just as well show you what they are, and let you select the kind of work you would like, and the kind of work you are best adapted for. After all is said and done, there are men who would rather shovel earth with class, than to drive a truck as an ordinary driver. Let us take a look at where the telecamera man works. In our present illustration he is working in a studio, as one out of several operators.

You will observe there are lights, a sound microphone with a boom (*boom is the gadget that moves the microphone in and out, so that it is closer or farther away from the performer as desired*). There are light technicians, sound technicians, directors, and even perambulator pushers. (*The perambulator is the device upon which the cameraman rides. It is pushed nearer or farther away to the scene as it is desired.*) It is not likely that a perambulator pusher can expect to earn much money--yet who can tell, stage hands earn eighty dollars a week for just pushing buttons in a theater. However, it is most likely that a perambulator pusher must know how to substitute as a telecamera operator.

There is scenery in the television station. It must be successfully designed to produce the impression desired. It must be painted to produce the shade desired. There are actors and actresses in the television studio, who must have a knowledge of how to move and perform properly before a television camera, and just how much or how little they must exaggerate their motions in order to produce the proper impression for the telecamera system. Of course the television camera is only the beginning of the television system. You recall the song about the "Music Goes in Here and Down and Around and Around and Comes Out Here"--well, a Television Station follows similar rules. The picture is focused in the television camera--Then the picture must



Three panels in the control room show what each camera sees. Thus the director (left rear) can cut from one to another at just the right split second. The man at his right directs the cameramen by telephone. The other two monitor the sight and sound.

Fig. 16. Master control room.

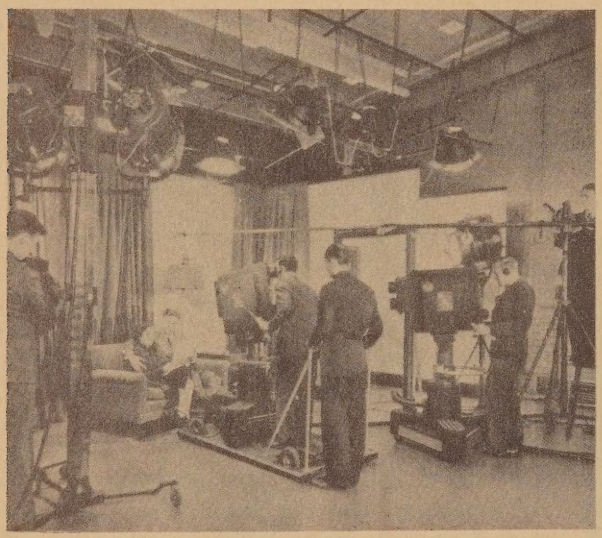


Fig. 17. Close-up scene in television studio.

Fig. 18. Master control room at NBC studios in New York.

be converted into electrical signals and it goes down through the cable from the television camera into the master control room, way down and around and around, through all the switching systems until it may be seen by the master control operator in the form of a picture, then he arranges it so that it goes around and around once more and on into the radio-television transmitter. In Fig. 16. we see the master control operators and a director. There are a large group of master control operators--they adjust the quality of the picture. A master control operator will very likely command a better salary than a telecamera operator. He must know just how much to feed in certain signals in order to get the best effect with the television pictures. He must be able to observe how to compensate for any distortion in the system. He must exaggerate any shadings that do not appear to have enough contrast, and above all, he must be able to recognize whether or not the system is performing up to normal at all times, in order to check the telecamera operators, and the telecameras, and the amplifiers, between his picture and the telecameras.

If you want to be a master control operator, you have to know more than the telecamera man. The master control operator makes the performance what it is. At the present time he is the highest paid man in the television operating profession. Of course, the general director in the master operating room, is the highest paid man in the station, but he must be a combination technician and artist in the direction of television performances. If you are a master control operator, you might be interested in the sweep circuit generators, the fundamental impulse signals--you would be interested in the shade compensation circuits, the frequency compensation circuits, and in the effect of the lighting technique. You would have to be familiar with many effects--you would have to create the illusion of darkness in a scene, even though the scene is brilliantly illuminated--or you would have to create the illusion of sunshine in the studio, even though the scene were taken in ordinary lighting. You would have to know whether or not the distortion in the picture, if any, developed from the iconoscope or the image dissector, or the electron multiplier, or the amplifier, or the amplifier power supply, or from many other different causes. All in all, the job of master control operator is a good one. The modern young man would say, you have to "know your onions" to be a master control operator.

Of course the television performance can't stop in the studio with the master control operator --the performance is only as far as the first valve. it has gone from the television camera down and around to the master control panel--now it has to go around

Fig. 19. Check instruments and operator.

Fig. 20. Checking picture quality on the surface of cathode-ray tubes.

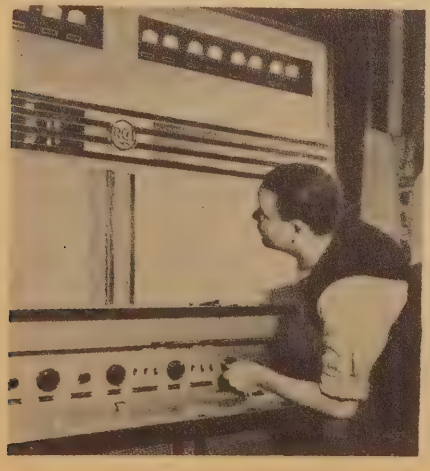


Fig. 21. Radio-Television transmitter and operator.

once more to the main line operator, who feeds the signals into the coaxial cable. It runs over to the television radio transmitter. The line operator watches the numbers of meters. If the meters do not read right, he does a considerable amount of telephoning, until the meters do read right. he does not need to be nearly so well informed as the other operators, but he has great responsibility, and must be vigilant at all times to see that the signals stay within certain levels, otherwise he knows that distortions will occur in the receivers. He has a very responsible position. The line operator has to know about amplifiers, attenuation, line compensation, amplitude overload, regeneration, and degeneration, and other jaw-cracking names that go with this profession. It is the one comparatively unromantic phase in the television system. It is about the same as working in a broadcasting station. You look and listen to all the programs. You earn a good salary, but you don't meet anybody--and you have the unpleasant task of heckling everybody to stay within the limitations provided, over the telephone.

The signal travels from the studio through the hands of the master control operator, out to the line operator, and over to the television radio transmitter which may be several miles away from the studio. The signal is then checked by another line operator at the radio station, to see that the picture is coming out good before it is put into the radio transmitter. The final control operator checks all the signal levels on oscillographs before him, and then feeds the signals carefully into the radio transmitter. Real power is dissipated into this electrical transmitter and another operator watches the meters that tell the details of operation carefully. The signal is emitted by a special antenna which does not look like an ordinary radio broadcasting antenna at all. Of course the sound goes right through this same transmitter along with the television signals. One part of the antenna emits the sound signal, whereas the other part of the antenna emits the television signal. of course both of them are radio signals when they are radiated out in space.

Television antennas are placed on the highest spots available, lightning rods protect the antenna and the television transmitter. So well designed are these systems, that the lightning strikes frequently during a program, without upsetting the performance. Indeed man has so organized the electrical sciences, that he can discharge full-fledged lightning bolts around his television transmitters, without interrupting the program seriously. We must have engineers to build this apparatus, and design

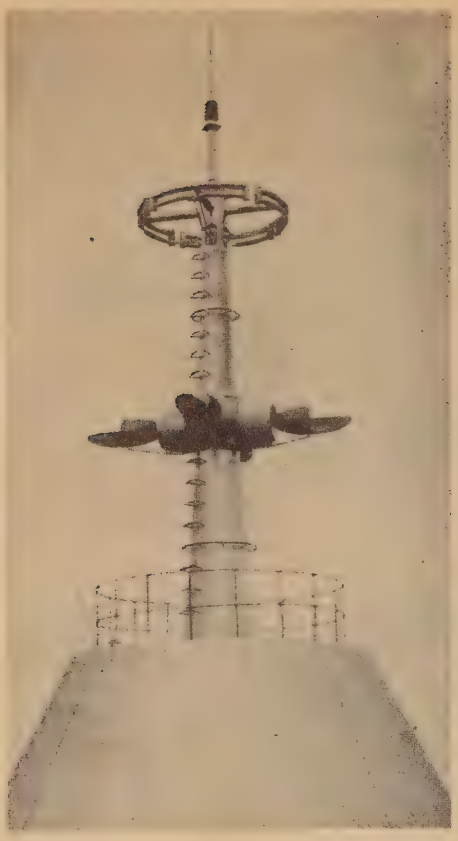


Fig. 22. Another view of television and sound antennae atop Empire State Building.

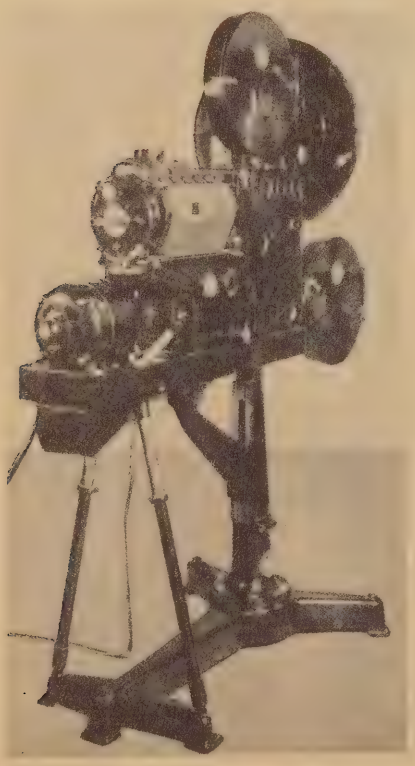
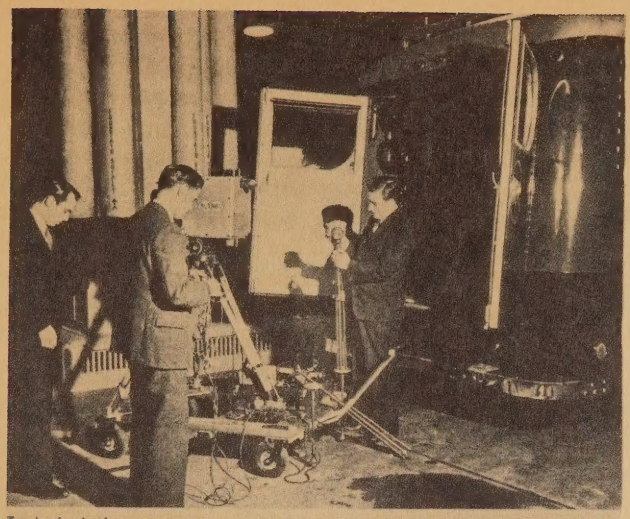


Fig. 23. Machine for broadcasting regular motion pictures.

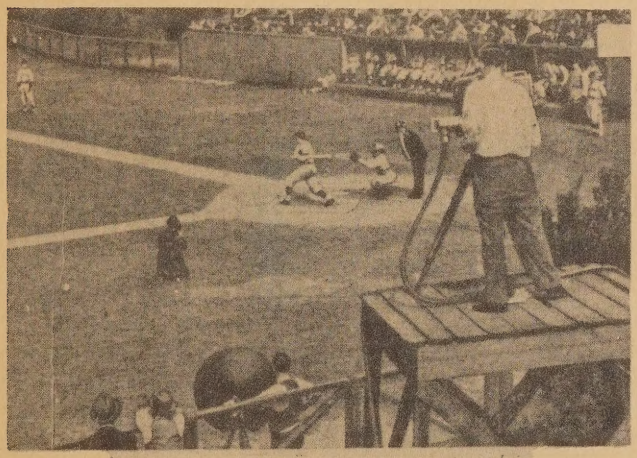
the installation of the equipment we have just talked about. The radio television engineer must know how far his station will reach--how much power it must emit to pass through hills and buildings and other obstacles--and he must know how far beyond the horizon his station will give service. If you have been following this discussion closely, you will ask, "How far does a television station actually reach? How many stations are necessary for national service? Do the stations interfere with one another? What about the receivers?--How far away can they pick up a station? Is the station just as clear wherever it is picked up? Why can not an ordinary radio station be used for the sound?"--And come to think of it, we omitted to tell about the many other parts that must go into the studio, for a full performance. We failed to mention the television motion picture operator. Filmed plays would be part of every show, as well as studio performances.

In Fig. 23, we see a television motion picture projector. The film does not need to be shown on a screen and then picked up by a television camera. Instead the film is put directly into a television projector with a television camera tube optically arranged, so that the picture is sent directly to the master control operator, and the person at the receiver, sees either a newsreel, or a popular motion picture, or a studio play. You may ask, "What about the baseball games and other sporting events, such as boxing?" Portable equipment is taken to each important event and the local section is connected up by telephone wire, special cable, or by radio television link. Yes, properly used telephone wires will carry television signals properly. Perhaps you have read in the newspaper that this can not be done.--Such is not the case. Please bear in mind that newspapers must necessarily cooperate with their advertisers. If a radio manufacturer feels that the public interest in television is hurting the sale of the radio receiver he wishes to advertise, he has one of his engineers write an article claiming that ordinary telephone wires can not be used for television broadcast purposes, and that therefore, it will be prohibitively expensive to broadcast television. Ordinary telephone lines are not used for ordinary radio broadcasting. It would be just as logical to say that ordinary broadcasting could not be done over ordinary telephone lines. Special compensated lines have to be used for radio broadcasting. Every day we read some article in a newspaper about the obstacles in television, obviously written by someone selling a $14.95 radio, hoping to improve the sale of the radio receiver, because they are afraid the public is not buying because people are waiting for television. It is very smart for the public to save their dollars for television. They will get better entertainment and a more satis-



Two ten-ton trucks are used every time any object is telecast outside of N.B.C.'s studios. In addition to "ikes" and lights the trucks have a transmitting plant which relays pictures to the telecasting station.

Fig. 24.



Since the opening of the World's Fair started television on its way a half year ago new vistas have been opened for drama and sports. The radio "eye" has been busy shifting from diamond to gridiron, from prize ring to stage to send televiewers binocularlike views of baseball and football, gladiators and actors.

Fig. 25.

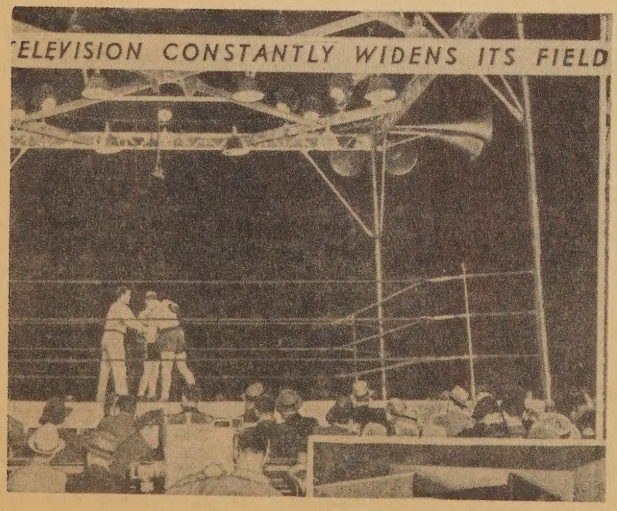
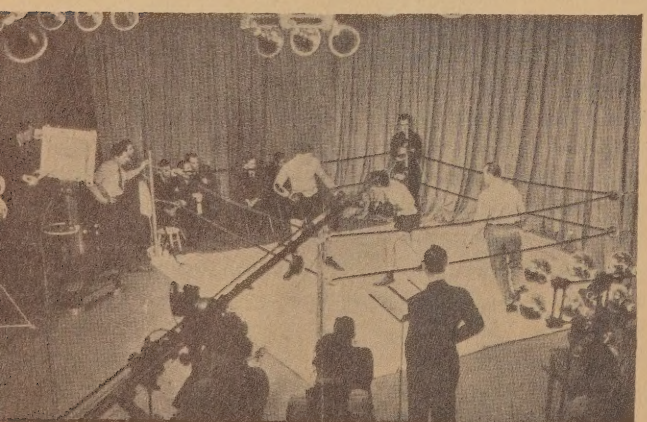


Fig. 26. Telecamera in the foreground picking up fight in Madison Square Garden.

factory return for the money they invest. Can you imagine just listening to a sound motion picture in the lobby of a theater. Would it compare with seeing and hearing at the same time? Ordinary radio is blind. *It is like living without your eyes to detect what is going on.* If you were given your choice of giving up your hearing or your eyesight for life, what would you take? There is no comparison between sound radio and television. It is much more entertaining and satisfactory to see something than to hear it, if you have to take your choice of one or the other. But with television, you see and hear the performance, so that you get both of the advantages of seeing and hearing, rather than just hearing alone. This brings up the question, "Will television eliminate radio?" If the radio manufacturer would think a little, he would stop worrying about television? Of course most of the important radio manufacturers have gotten into television. Television will not replace ordinary radio. You have to look at a performance on the screen in your own home in order to enjoy it. You may be looking at the Mickey Mouse cartoons, and also listening to them. You would hardly sit down to dinner while such a program was going on. You would not dance to it. A woman would not run the vacuum cleaner, or cook dinner and look at the "March of Time" at the same moment. Television is like going to the theater. You must drop everything else and relax and watch the performance. Whether it be a baseball game, a football game, a boxing match, a studio performance, a newsreel, a comedy, or a full length motion picture. If it is advertising we must look at, we must look at it. Ordinary radio occupies quite a different place. You turn on your receiver, and usually listen to it while you do many other things.--You talk while the program goes on.--You mentally forget about it when it says, *buy something.* You can have radio in your automobile, in your office, or in your home--in some obscure corner, tuned way down and grunting away with some type of music that helps to pass away the time. It is useful for reporting certain types of news. The important hours on radio will pass over to television. Actually it means moving the theater into the home. Radio stations and radio station operators and engineers and men in the radio business, hardly need become identified with television. It is more logical for persons in the motion picture and theater business than it is for radio stations to go into the business. The average radio technician does not have much advantage over the beginner in learning television. The radio station contributes nothing to the television program. The sound devices and the amplifiers used for television are more advanced and modern than that employed in the average radio broadcasting station; and the actual radio transmitter has

Fig. 27. Note the telecamera on the left.

Fig. 28. Note the telecamera in the upper right.



Lou Nova and Patsy Perroni go into the television camera here ...

Fig. 29.

no value whatsoever to the television transmitter. Even the radio studios are not properly designed for television performance. Therefore, the television business is really open to everybody. The beginner does not have far to go to catch up with men in other professions as far as television is concerned. We primarily prefer that the man going into television is not overloaded with his own impression of how much he knows about the subject, or about how well he knows radio or photography. We need the man who says, *"I want to get in on the ground floor of the television business with an open mind. I want to learn the business from the very beginning from men who are leaders in this field so that I can step into the industry with a minimum amount of wasted effort and in the shortest possible space of time and with the best possible qualifications."* Now that we have discussed some interesting facts about television, let us make a preliminary examination of some of your present qualifications in order that our engineers may determine your probability of success in this field.

QUESTIONS ON THIS ASSIGNMENT

1. Why will television be a great benefit to America economically?
2. Why do you feel that you would like to get into television work?
3. From this assignment, what type of television work do you feel you would like to qualify for?
4. How perfect is television at the present time?
5. How did television happen to become fully developed in the laboratory before it was offered to the public?
6. Give approximately the number of television stations that will be required to cover the country.
7. Why is it not logical to expect to get into the television industry after it is fully grown?
8. If employment is offered to you in the television field when you are qualified, what minimum starting salary will you accept?
9. Who is Dr. Lee De Forest?
10. Who is U. A. Sanabria?
11. Give the definition of an engineer.
12. What companies make television cameras?
13. What is the "boom" in a television studio?

14. What is the "perambulator" in a television studio?

15. What is the job of master control operator?

16. What is the job of the line operator?

17. What is the job of the final control operator?

18. Would an ordinary broadcasting station be any advantage in connection with a television station? Describe.

19. Can lightning flash around a television antenna without destroying the apparatus?

20. Why do radio companies publish articles about the obstacles facing television?

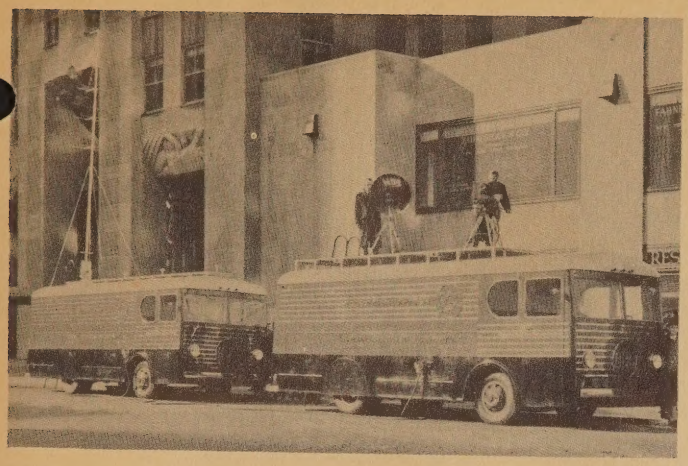


Fig. 30. RCA-NBC Telemobiles. The front one carries the camera and amplifier equipment, and the rear one the radio transmitter for projecting the picture to the main station where it is rebroadcast.

Fig. 31. Special slickers are used to cover the telecamera and the operator when telecasting is done in the rain.

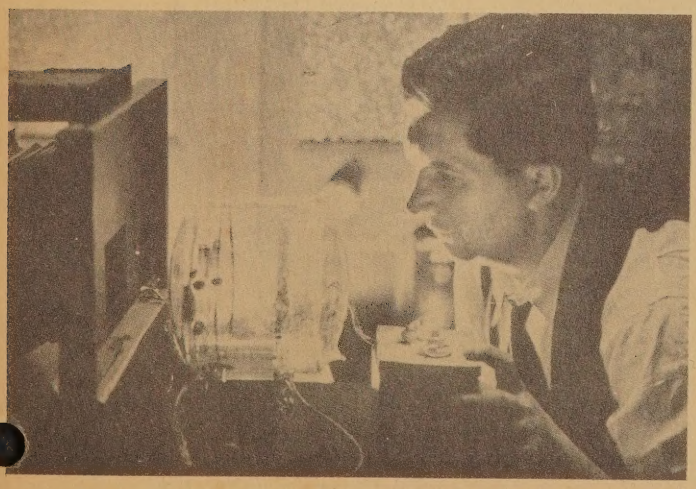


Fig. 32. Laboratory Technician building iconoscope -- the heart of the telecamera.

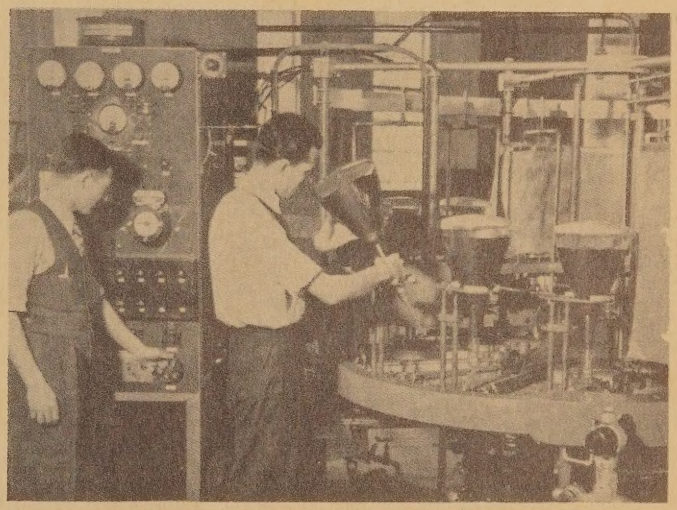


Fig. 33. Laboratory Technician building television receiving tubes.

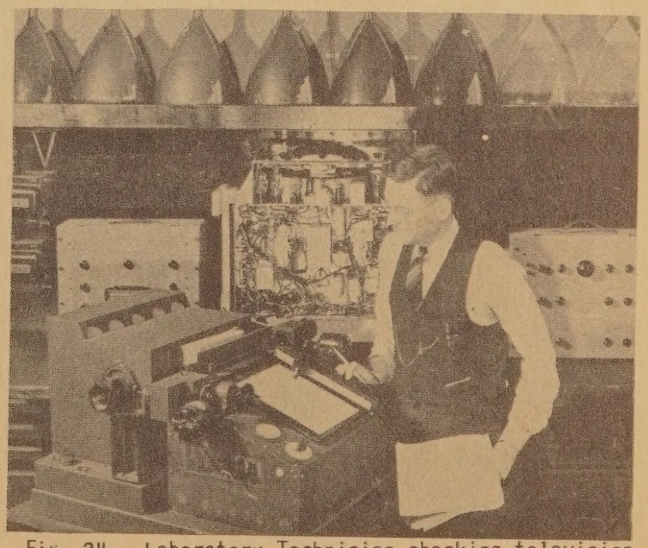


Fig. 34. Laboratory Technician checking television equipment. The big tubes in the background are receiving tubes.

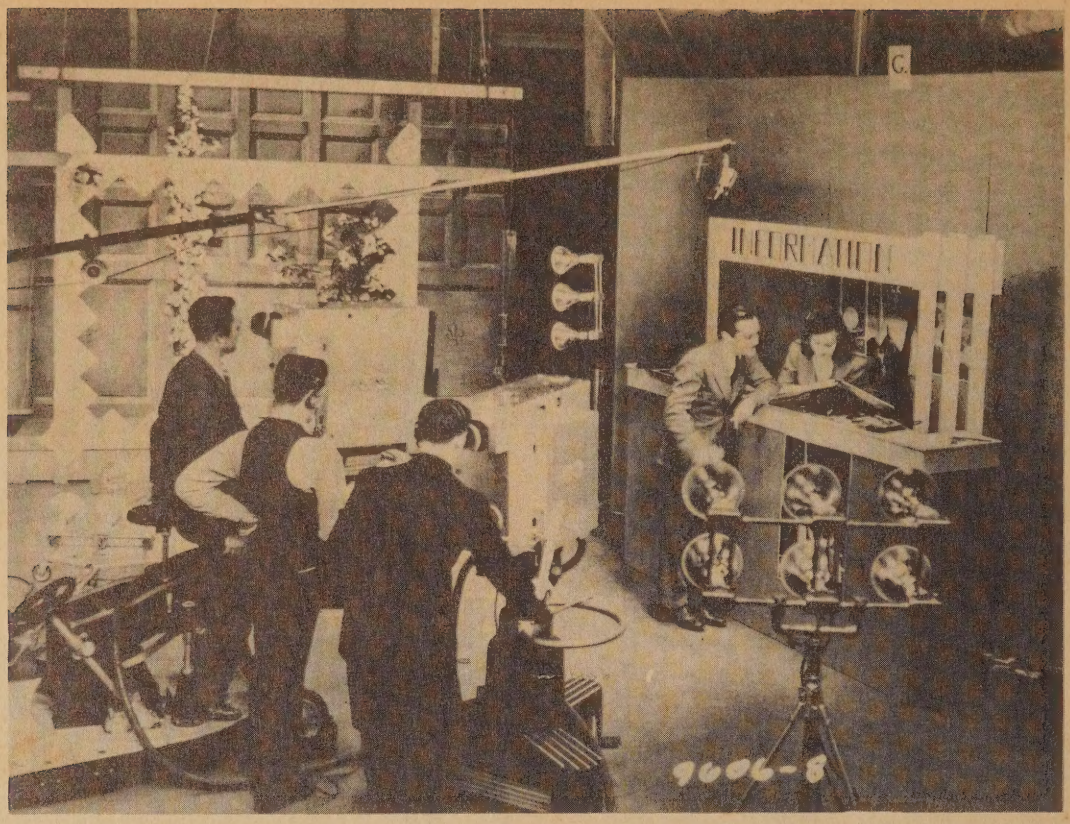


Fig. 35. A studio scene showing the long arm dropping the microphone over the performers and the camera technician working in close.

Fig. 36. The final result of all television work -- a perfect performance on the screen of the television receiver in the American home.